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EUROPEAN PATENT APPLICATION

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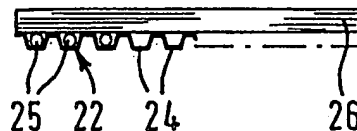
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⑤④ Atmosphere control device.

⑤⑦ An atmosphere control device comprises a container 22 having a rigid wall and an opening which is covered by a gas-permeable material (26). An active ingredient, such as potassium permanganate pellets (25) is retained in the container (22), for absorbing ethylene from the surroundings. The container (22) may comprise an array of recesses (24), each containing a single pellet (25) of the active ingredient. In use, the device may be included in a package of perishable produce, such as fruit. The device absorbs ethylene from the package, which retards ripening and deterioration of the produce.

FIG.6.



Description

ATMOSPHERE CONTROL DEVICE

This invention relates to an atmosphere control device which is suitable, for example, for emitting a component to, or extracting a component from, the surrounding atmosphere. One specific use of a device in accordance with the present invention is to maintain the freshness of produce kept, for example in a refrigerator.

According to the present invention there is provided an atmosphere control device comprising an active ingredient packed in an enclosure, characterised in that the enclosure comprises a rigid container for the active ingredient, the container having an opening which is covered by a gas-permeable material.

In one embodiment, the rigid wall of the container is made from a stiff, foldable material such as carton board. The container may be elongate, with a square cross-section, with openings provided in one or more of the long sides. Each side may be provided with more than one of the openings.

In another embodiment, the container may be made from plastics material which is formed to provide one or more cup-shaped recesses. The open end of the or each recess is covered by the air permeable material.

The active ingredient will be selected to provide an appropriate influence on the ambient surroundings. If the device is to be used to maintain the freshness of fruit in domestic refrigerators, the active ingredient may comprise potassium permanganate. The potassium permanganate may, for example, be mixed with a suitable carrier, such as iron oxide, and formed into pellets.

Potassium permanganate absorbs ethylene, and consequently reduces deterioration of fruit and vegetables. Other active ingredients may be used for different purposes. For example, calcium hydroxide will absorb not only ethylene but also carbon dioxide, and hygroscopic compounds will absorb moisture.

For a better understanding of the present invention, and to show how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 shows an atmosphere control device;

Figure 2 shows a blank from which the container of the device shown in Figure 1 is formed;

Figure 3 is a fragmentary sectional view of the material from which the blank of Figure 2 is formed;

Figure 4 shows packaging for the retail sale of the device of Figure 1;

Figure 5 is a plan view of an alternative form of atmosphere control device;

Figure 6 is a side view of the device of Figure 5; and

Figure 7 represents diagrammatically how the device of Figures 5 and 6 is made.

The device shown in Figure 1 comprises an

elongate container of generally square cross-section. The container is formed from the blank shown in Figure 2, which comprises two layers 2, 4 of material. The layer 2 is relatively rigid and may, for example, comprise carton board, while the layer 4 is relative flimsy and gas-permeable and may comprise, for example, an unwoven fabric formed from natural or synthetic fibres.

The container as shown in Figure 1 has, on each of three sides, three oblong openings 6. These openings 6 are formed in the rigid layer 2, as shown in Figure 3, but are covered by the gas-permeable layer 4.

In the illustrated embodiment, the gas-permeable layer 4 covers the entire extent of the rigid layer 2. However, it would be possible to apply the gas-permeable layer only over that region of the blank shown in Figure 2 which is occupied by the openings 6.

The blank shown in Figure 2 comprises three panels 8 provided with the openings 6, and a fourth panel 10 which is continuous. The blank also has a glue flap 12 and end tabs 14. To form the container, the flap 23 is glued to the inside surface of the panel 10, and the tabs 14 at one end are folded down and glued together to close that end. The partially formed container is then filled with an active ingredient, such as potassium permanganate pellets or granules, and the tabs at the other end are then also folded down and glued.

For use, the device is placed in a refrigerator or other food storage cabinet. Air is able to pass through the material 4 covering the openings 6, and so circulates through the device with the result that ethylene gas is absorbed by the potassium permanganate. Ripening and subsequent deterioration of fruit is retarded in the absence of ethylene, and consequently produce in the refrigerator will keep longer in the presence of the device. Also, the active ingredient will absorb odours in the refrigerator or other storage cabinet and so prevent or reduce cross-tainting of produce. Thus, for example, mild-flavoured products, such as butter, will not become tainted with the flavour of more strongly flavoured products, such as cheese.

Figure 4 shows a package suitable for containing and displaying the device for retail sale. The package comprises a box portion 16, which accommodates the device itself, and a panel 18 provided with a hole 20 suitable for suspending the package from a hook for display purposes. The device is pre-packed in an airtight enclosure, for example in a flow-wrapping process using a flexible film, before insertion into the box portion 16. This avoids deterioration of the effectiveness of the active ingredient before the device is used by the purchaser.

An alternative atmosphere control device is shown in Figures 5 and 6. This device is suitable for inclusion in a foodstuff package, for example in a box of fruit or vegetable produce, to retard ripening and/or deterioration of the produce.

The device comprises a container in the form of a tray 22 which has an array of relatively small recesses 24. Each recess may have a depth slightly larger than 2mm, and will contain a small quantity of an active ingredient, such as potassium permanganate. If the active ingredient is supplied in the form of pellets 25, it is convenient for each recess 24 to contain a single pellet. The tray is made from unplasticised poly(vinylchloride) (uPVC).

A layer 26 of air permeable material is bonded over the tray 22 to close the recesses 24. In the specific example shown, the material is a bonded fibre material having a fusible polyethylene coating, and may be the material available under the designation "XPS125" with a weight of 15g/m². The layer 26 is welded to the tray 22 along lines 28 running between the recesses 24.

Figure 7 shows, diagrammatically, a process by which the device of Figures 5 and 6 may be formed. uPVC is drawn from a roll 30 through heater boxes 32, where it is softened, and then through a forming head 34, which forms the recesses 24. A dispenser 36 of potassium permanganate pellets (available under the name "ETHYSORB") discharges the pellets over the surface of the tray 22. A doctor blade 38 distributes the pellets evenly over the surface of the tray 22, so that each recess 24 receives a single pellet, excess pellets being returned to the dispenser 36.

The bonded fibre material 26 is drawn from a roll 40 on to the surface of the filled tray 22, and welded along the lines 28 by means of a welding head 42. A cutting head 44 removes excess material from the sides of the tray 22, this excess material being received by a waste roll 46.

The resulting devices may be placed, for example, in the bottom of boxes intended to receive fresh fruit. The size of the device which is used in any particular application will depend on the expected quantity of ethylene to be absorbed in order to keep the produce in a proper condition for the required length of time. Because the device is relatively thin and flat, it will not project significantly into the box, and consequently will not damage the produce subsequently placed into the box.

Claims

1. An atmosphere control device comprising an active ingredient packed in an enclosure, characterised in that the enclosure comprises a rigid container for the active ingredient, the container having an opening which is covered by a gas-permeable material (4,26).

2. A device as claimed in claim 1, characterised in that the container is in the form of a box, the opening being formed in a wall of the box.

3. A device as claimed in claim 2, in which the opening is one of a plurality of openings formed in different walls of the box.

4. A device as claimed in claim 2 or 3,

characterised in that the box is formed from an apertured blank to which is bonded a layer of the gas-permeable material.

5. A device as claimed in claim 1, characterised in that the container comprises a cup-shaped recess covered by a layer of the gas-permeable material.

6. A device as claimed in claim 5, characterised in that the container is in the form of a tray having a plurality of the recesses.

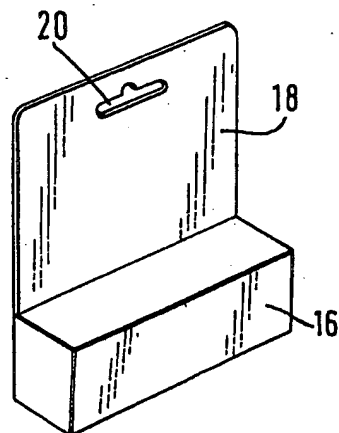
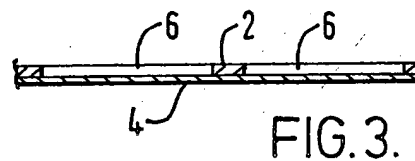
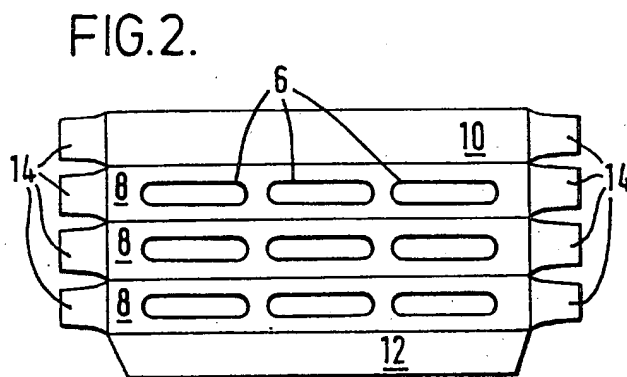
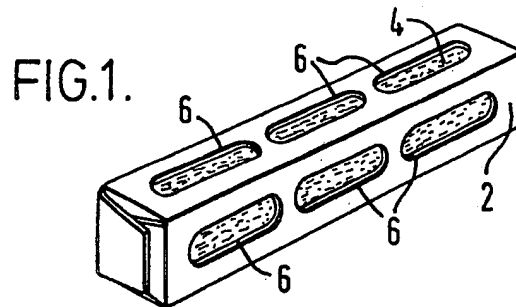
7. A device as claimed in claim 6, characterised in that all of the recesses of the tray are covered by a common layer of the gas-permeable material.

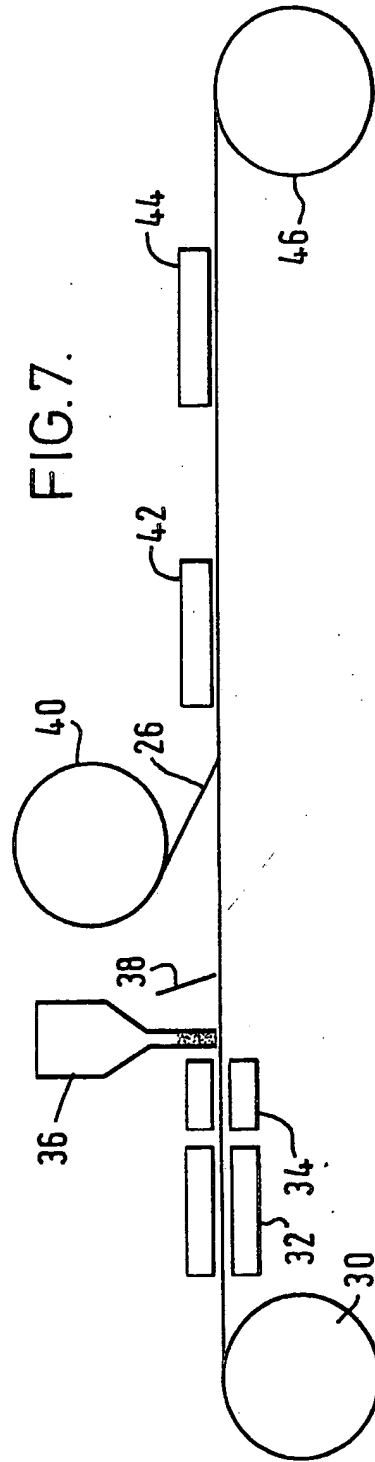
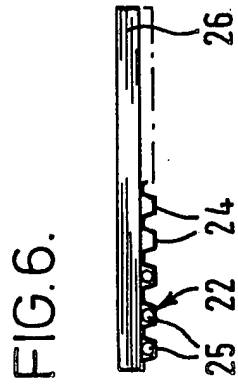
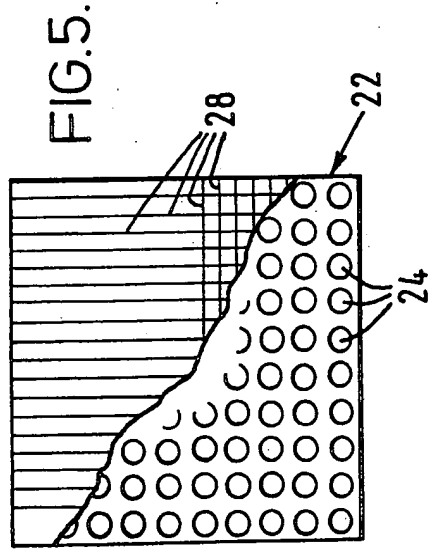
8. A device as claimed in claim 6 to 7, characterised in that the active ingredient is in pellet form, each recess of the tray containing a single pellet.

9. A device as claimed in any one of claims 5 to 8, characterised in that the gas-permeable material is a polyethylene coated bonded fibre material.

10. A device as claimed in any one of claims 5 to 9, characterised in that the gas-permeable material is welded to the container.

11. A package containing perishable produce and a device in accordance with any one of the preceding claims.







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 30 9431

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	US-A-4 235 750 (CAZALET) * Abstract; column 4, lines 36-48; column 8, line 57 - column 9, line 54; figures *	1-3,5-8 ,10-11	B 65 D 81/24
Y	---	4,9	
Y	EP-A-0 230 191 (SOCIETE CIVILE DE RECHERCHES DES PRODUITS DU SOLEIL) * Column 4, lines 14-19; claim 1; figures *	4	
Y	---	9	
Y	US-A-4 579 223 (OTSUKA et al.) * Column 2, lines 44-52; column 5, line 64 - column 6, line 7 *		

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 65 D A 23 B A 61 L
Place of search THE HAGUE		Date of completion of the search 23-11-1988	Examiner CLARKE A.J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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